

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF: Kenji YAMAMOTO, et al.

SERIAL NO: New Application

GAU:

FILED: Herewith

EXAMINER:

FOR: HARD FILM EXCELLENT IN ADHESION AND METHOD OF PRODUCING THEREOF

INFORMATION DISCLOSURE STATEMENT UNDER 37 CFR 1.97

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

Applicant(s) wish to disclose the following information.

REFERENCES

- ☒ The applicant(s) wish to make of record the references listed on the attached form PTO-1449. Copies of the listed references are attached, where required, as are either statements of relevancy or any readily available English translations of pertinent portions of any non-English language references.
- ☐ A check or credit card payment form is attached in the amount required under 37 CFR §1.17(p).

RELATED CASES

- ☐ Attached is a list of applicant's pending application(s) or issued patent(s) which may be related to the present application. A copy of the patent(s), together with a copy of the claims and drawings of the pending application(s) is attached along with PTO 1449.
- ☐ A check or credit card payment form is attached in the amount required under 37 CFR §1.17(p).

CERTIFICATION

- ☐ Each item of information contained in this information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this statement.
- ☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application or, to the knowledge of the undersigned, having made reasonable inquiry, was known to any individual designated in 37 CFR §1.56(c) more than three months prior to the filing of this statement.

DEPOSIT ACCOUNT

- ☒ Please charge any additional fees for the papers being filed herewith and for which no check or credit card payment is enclosed herewith, or credit any overpayment to deposit account number 15-0030. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

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STATEMENT OF RELEVANCY

Reference AA (4,683,043) of Form PTO-1449:

This document does not disclose hardening a layer form which CBN is formed by adding a metal element.

Reference AO (4-57604) of Form PTO-1449:

This reference is explained in the specification.

PURPOSE: To improve the durability of a cutting tool made of a tungsten carbide based sintered alloy having a boron carbide coat by causing the boron carbide coat to contain the outermost layer composition expressed as BxC (x: 3.5 to 4.5) and the innermost layer composition expressed as BxC (x: 0.5 to 2).

CONSTITUTION: The boron carbide coat of a cutting tool is formed in such a way that boron concentration gradually decreases continuously or discontinuously in a thickness-wise direction from the outermost layer to the innermost layer, and the innermost layer of the boron carbide coat in contact with a tungsten carbide base sintered alloy parent material is made to have a composition of BxC (x: 0.5 to 0.2). The outermost layer of the boron carbide coat is prepared to a composition of BxC (x: 3.5 to 4.5), and the thickness thereof is 0.5 to 2.0 μm . The boron carbide coated WC base sintered alloy tip of the aforesaid construction substantially increases in cutting time up to the end of lifetime, and is all the more superior in abrasion resistance.

Reference AP (4-57605) of Form PTO-1449:

This reference is explained in the specification.

PURPOSE: To improve the durability of a cutting tool made of a tungsten carbide base sintered alloy parent material by forming a B₄C coat on the surface of the material via a single or plurality of undercoats comprising a compound of carbide or the like of Ti, Zr and Hf.

CONSTITUTION: A B₄C coat is formed on the surface of a tungsten carbide base sintered alloy parent material via an undercoat having a single or plurality of layers comprising a compound of one or more of the carbide, nitride, carbon nitride and boride, and the solid solution thereof. A cutting tool is thereby manufactured. The aforesaid B₄C coat has a thickness of 0.5 to 3.0 μm , and the undercoat has a thickness of 0.5 to 5.0 μm . The boron carbide coated cutting tool so manufactured has a substantially long cutting time during the lifetime of a tip, and has all the more superior abrasion resistance.

Reference AQ (2002-167205) of Form PTO-1449:

This reference is explained in the specification.

PROBLEM TO BE SOLVED: To provide a hard boron nitride coating film which is superior in high temperature heat resistance and abrasion resistance and is sufficiently improved in adhesiveness.

SOLUTION: A composite coating film, being coated on a substrate surface, is primarily composed of cubic system boron nitride and/or hard boron nitride including a cubic system. The heat resistant, composite, hard coating film contains one or more metals, selected from transition metals in IVa, Va, VIa groups, Al and Si, in 1-3 at.%,

Reference AR (3-260061) of Form PTO-1449:

PURPOSE: To form a thin film of C-BN or W-BN at low temp. without being affected by a substrate by forming a BN thin film on the substrate surface through an intermediate layer of a specified element.

CONSTITUTION: A thin film 12 of the cubic sphalerite-type boron nitride C-BN having extremely high hardness and thermal and chemical stability or the hexagonal wurtzite-type boron nitride W-BN having excellent chemical stability and resistance to thermal shock and wear is formed on the surface of a substrate 1 of high-speed steel, etc. In this case, the substrate 1 is supported by a holder 2. Si, for example, among groups 3a, 4a and 4b elements as the vaporization source 10 is vapor-deposited from a vaporization source 4 opposite to the substrate on the substrate 1 surface by an electron beam, etc., and the surface is irradiated by N ion 5' from an ion source 5 to form an Si-containing, intermediate layer 11 on the substrate 1. A B-based vaporization material 9 in a vaporization source 3 is vaporized by an ion beam and deposited on the intermediate layer 11, and the substrate is irradiated by N ion from the vaporization source 5. As a result, the thin film 12 of C-BN or W-BN is deposited with high adhesion without damaging the material of the substrate.

This document does not disclose hardening a layer from which cBN is formed by adding a metal element/

Reference AW and AX of Form PTO-1449:

These references are explained in the specification.

Form PTO 1449 (Modified)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTY DOCKET NO. 246929US3		SERIAL NO. New Application	
LIST OF REFERENCES CITED BY APPLICANT				APPLICANT Kenji YAMAMOTO, et al.			
				FILING DATE Herewith		GROUP	
U.S. PATENT DOCUMENTS							
EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUB CLASS	FILING DATE IF APPROPRIATE
	AA	4,683,043	07/28/87	Carl W. MELTON, et al.			
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						
	AL						
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	AN						
FOREIGN PATENT DOCUMENTS							
		DOCUMENT NUMBER	DATE	COUNTRY	TRANSLATION		
					YES	NO	
	AO	4-57604	02/25/92	Japan		X	
	AP	4-57605	02/25/92	Japan		X	
	AQ	2002-167205	06/11/02	Japan		X	
	AR	3-260061	11/20/91	Japan		X	
	AS						
	AT						
	AU						
	AV						
OTHER REFERENCES (Including Author, Title, Date, Pertinent Pages, etc.)							
	AW	T. ECKARDT, et al., "IMPROVING TRIBOLOGICAL PROPERTIES OF SPUTTERED BORON CARBIDE COATINGS BY PROCESS MODIFICATIONS", Hauzer Techno Coating News Letter, April 17, 2001, pgs. 1 - 15.					
	AX	K. YAMAMOTO, et al., "STRUCTURAL FEATURES OF THICK C-BORON NITRIDE COATING DEPOSITED VIA A GRADED B-C-N INTERLAYER", Surface and Coatings Technology 142-144 (2001) pgs. 881 - 888.					
	AY						
	AZ					<input type="checkbox"/> Additional References sheet(s) attached	
Examiner					Date Considered		
*Examiner: Initial if reference is considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.							